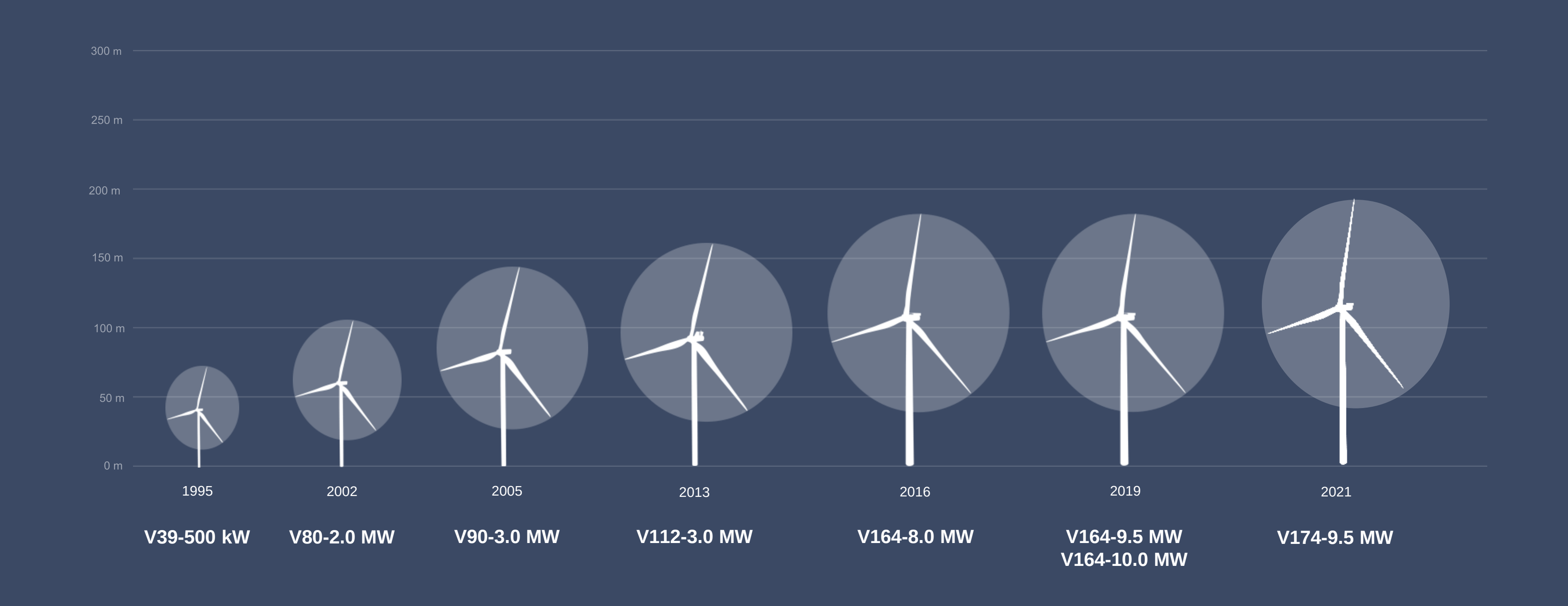



# **Developments in wind power turbine technology:** Taiwan and typhoons

**GARY SUN**
National Sales Director - Taiwan

# **Innovation** and performance improvement.

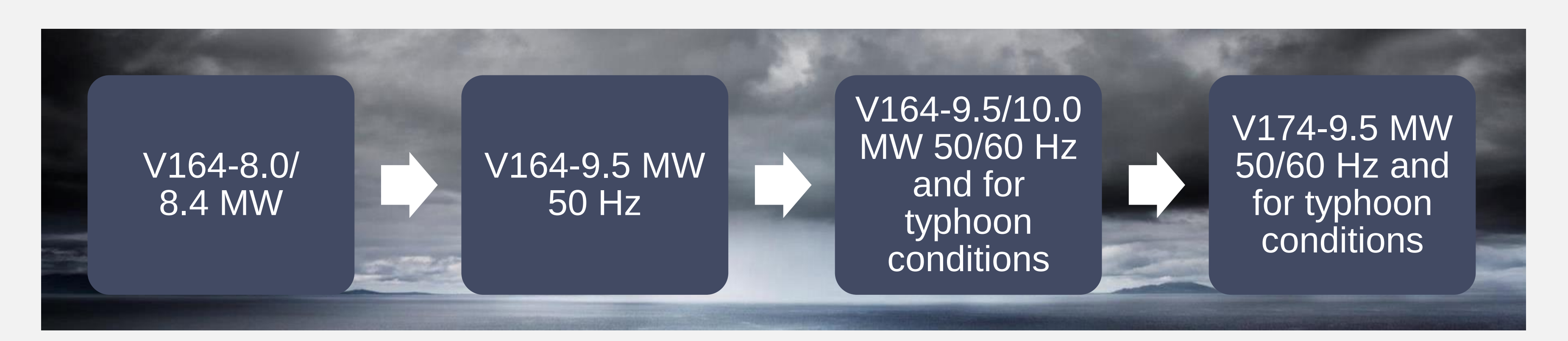
## From an on-shore turbine to a purpose build offshore turbine



# 9 MW Platform

## Controlled product development based on initial platform development and incremental steps

- We are **building on the experience** from our V164-8.0/8.4 MW WTG since 2014
- Product optimisations are introduced in **incremental steps**, enabling us, our customers, banks and advisors to **benefit from the Type Certification** of the V164-8.0 MW
- The **track record and field experience** makes the V164-9.5/10.0 MW WTG a low risk choice
- V164-9.5/10.0 MW 60 Hz and **IEC T (60 Hz version type certificate received in May 2019)**
- V174-9.5 MW 50/60 Hz is a **new variant based on same platform design, also IEC T**

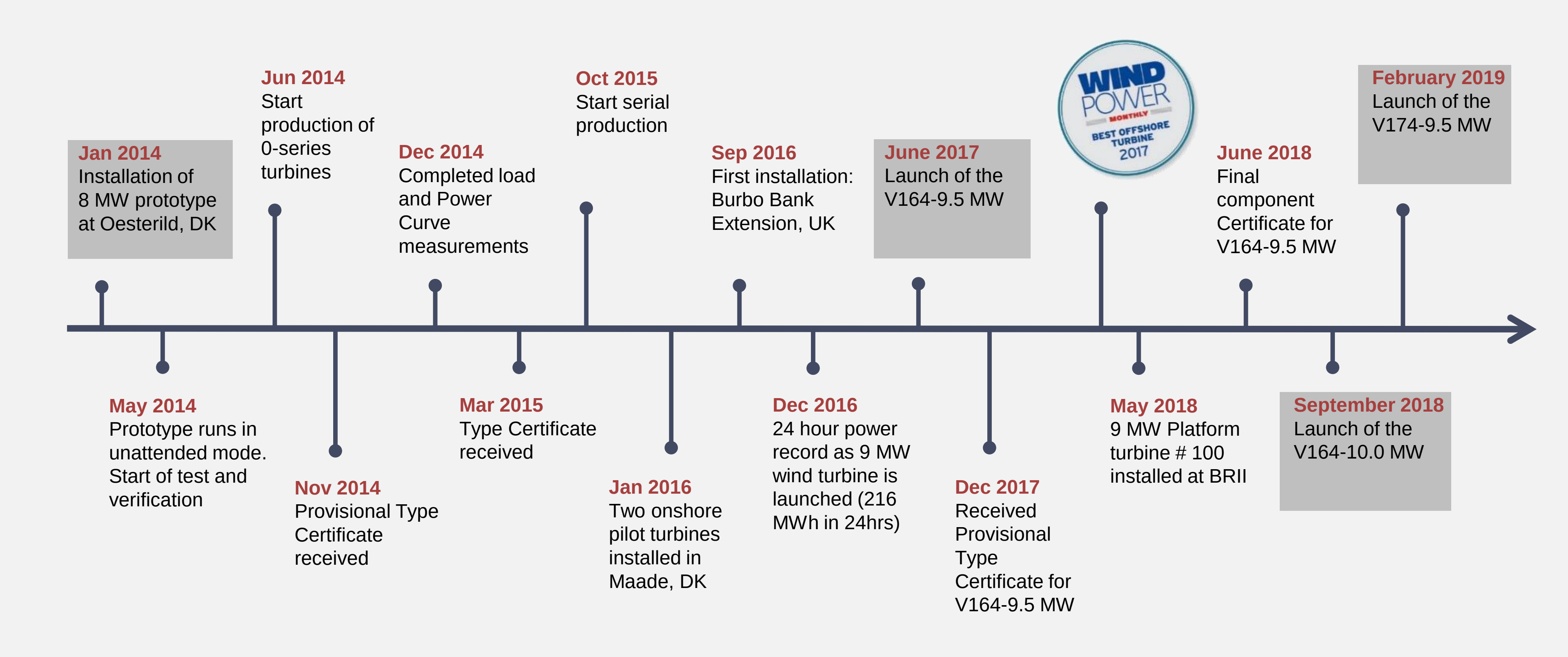





**MHI VESTAS** OFFSHORE WIND™

# 9 MW Platform development history

## From 8.0 MW to 10.0 MW in 4 years – proven concept, commercially available






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# The first double digit commercial offshore wind turbine

## The V164-10.0 MW™ is commercially available, and ready for installation from 2021

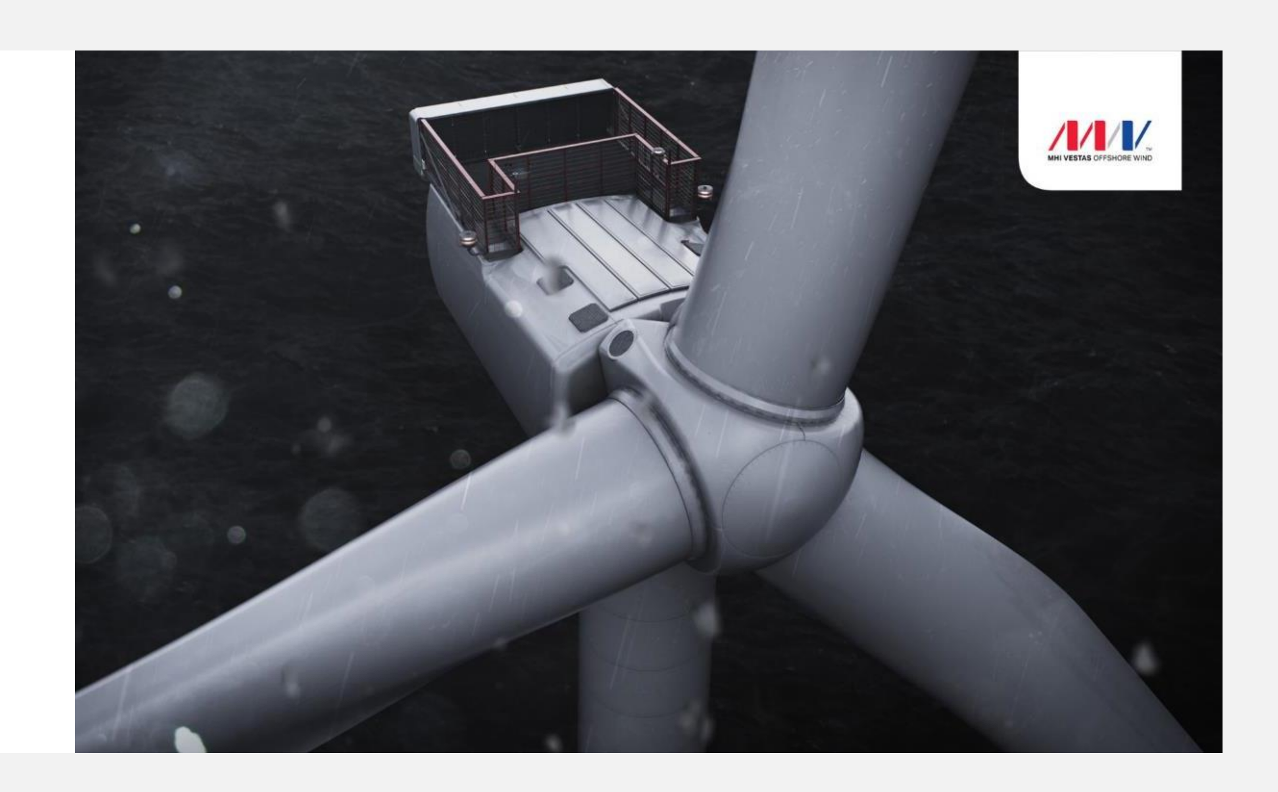
- Built on **proven technology** with a strong track record from the 9 MW Platform family
- More than **200 V164 turbines have already been installed**
- **Minor upgrades** required:
  - a stronger gearbox
  - minor mechanical upgrades
  - a small design change to enhance air flow and increase cooling in the converter
- Upgrades ensure the V164-10.0 MW can **run at full power**, at a site with wind speeds of 10 m/s, for 25 years



# Our largest rotor and IEC T class turbine introduced

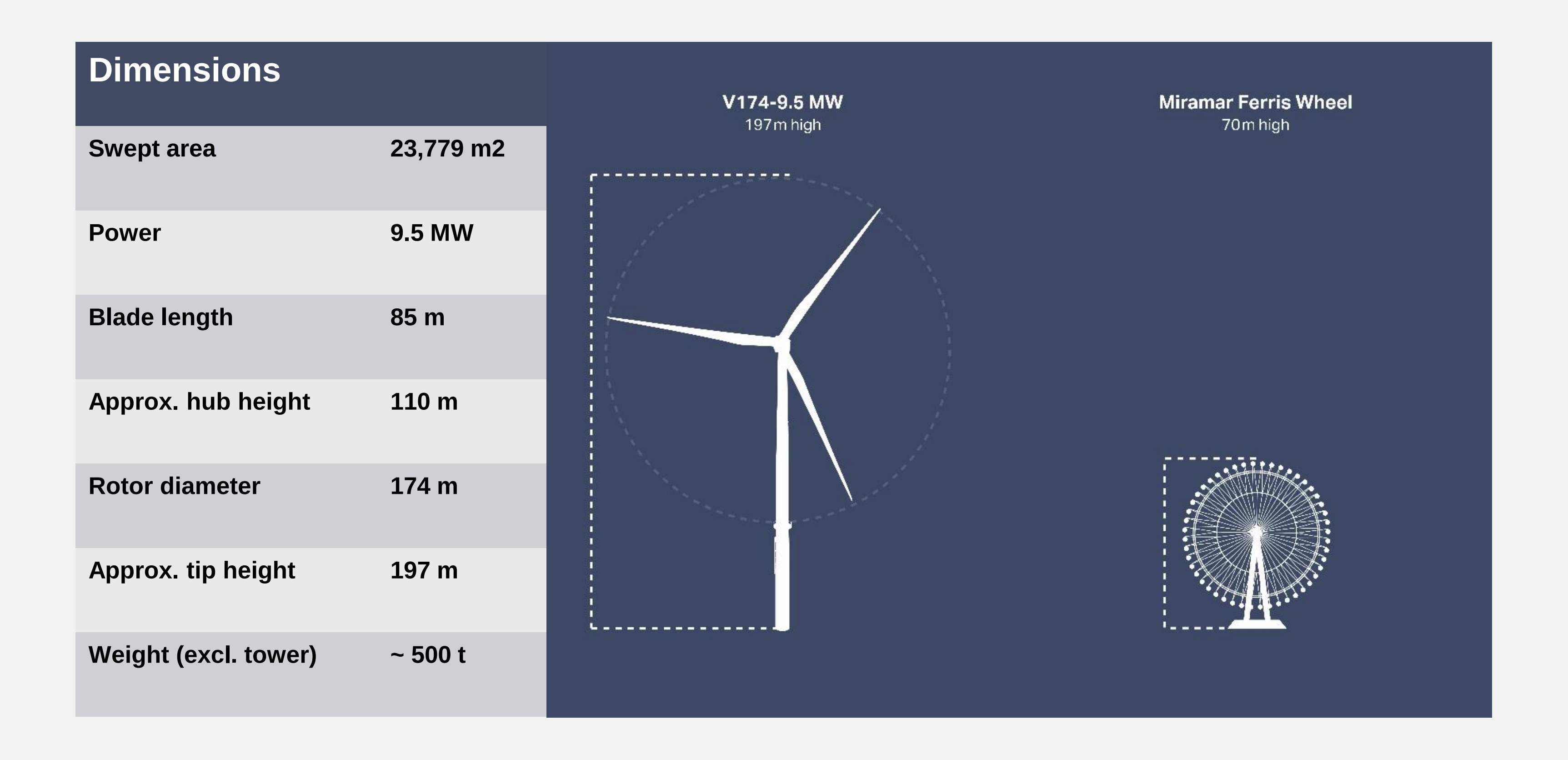
## The V174-9.5 MW™ is commercially proven

- Built on **proven technology** with a strong track record from the 9 MW Platform family
- **Minimal design changes** required
- Configured for **worldwide application** engineered for **IEC T**
- New 85-meter blade design profile, engineered to maximise **annual energy production**
  - Minimising structural loads, the advanced pre-bend blades are aerodynamically efficient
  - Each blade weighs 35 tonnes, same as the V164-9.5 MW 80-meter blade



# Dimensions of the V174-9.5 MW™

## Nearly 3 times the height of the Miramar Ferris Wheel

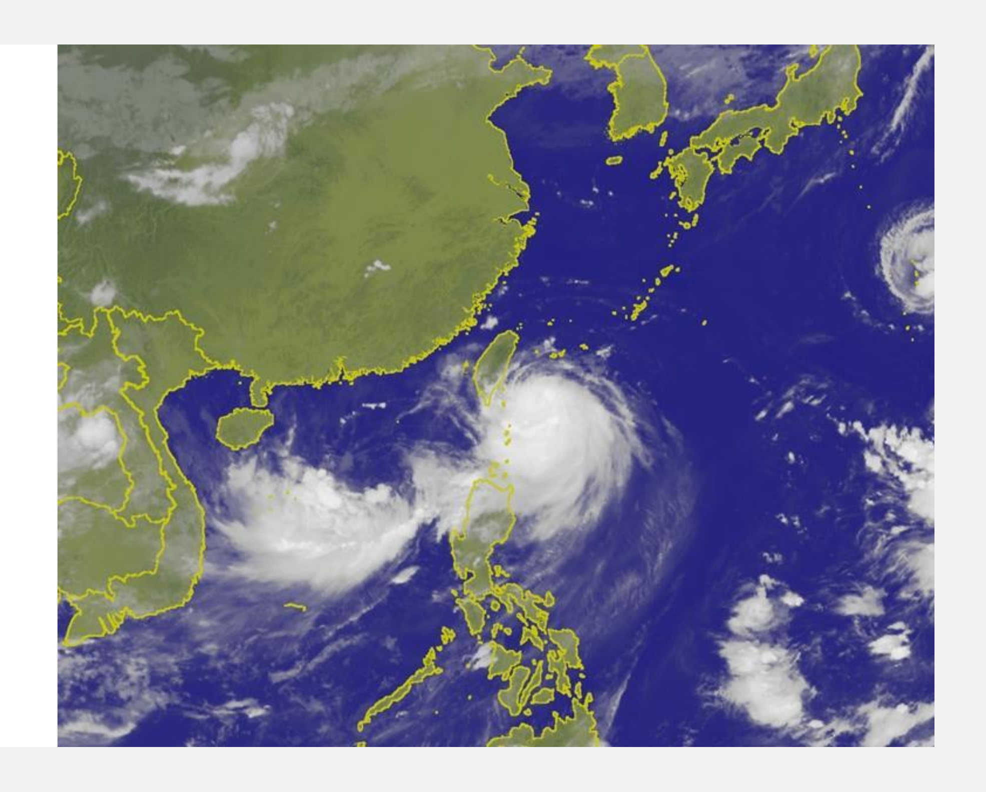


| Dimensions | |
|---|---|
| Swept area | 23,779 m2 |
| Power | 9.5 MW |
| Blade length | 85 m |
| Approx. hub height | 110 m |
| Rotor diameter | 174 m |
| Approx. tip height | 197 m |
| Weight (excl. tower) | ~ 500 t |

# Readiness for the Taiwanese market

## Demanding conditions to be considered

- Taiwanese market sees some **pronounced environmental conditions**
- Typhoon wind conditions are the most critical and need to be **carefully considered**
- We have worked **closely with customers** to understand these conditions
- The conditions are input into the **design and development process**





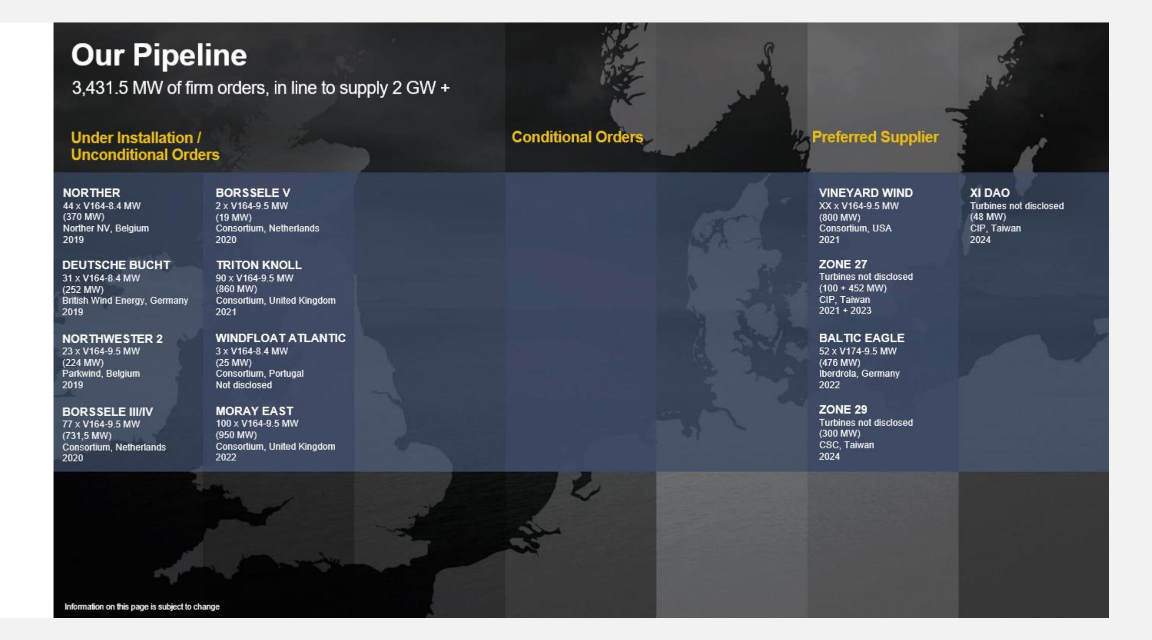
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# Readiness for the Taiwanese market

## Work with certifying body and order pipeline support the introduction of a mature product

- MHI Vestas has worked closely with DNV GL as certifying body to ensure that the 9 MW platform variants can be **certified** for the demanding Taiwanese site conditions, making the **WTG ready for typhoon conditions**

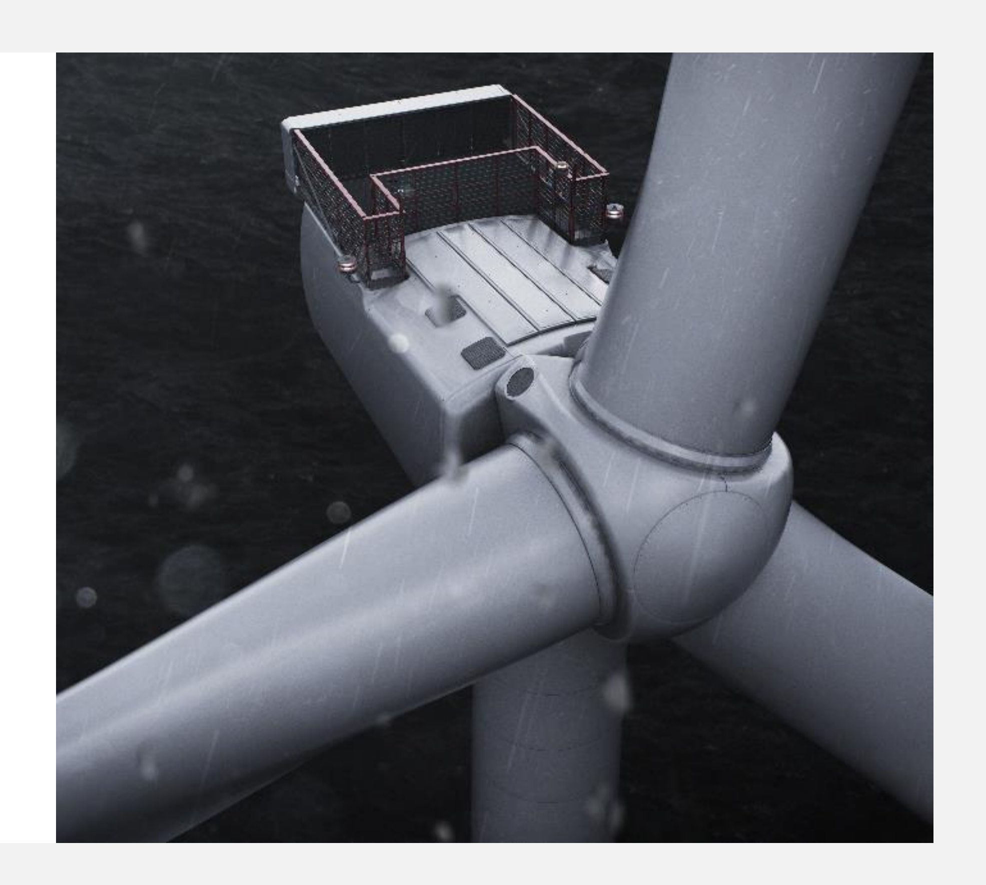
- This **early alignment with DNV GL** confirms to customers, banks and advisors that MHI Vestas is **fully prepared for and committed** to the Taiwanese market



# Readiness for the Taiwanese market

## 9 MW Platform, 60Hz, typhoon ready product, for projects in 2020

- Manufacturing of 9 MW Platform turbine **ready to commence** early 2020 with the following configuration:
  - **Configured to 60Hz operation**
  - **Operation in extreme wind**
- Designed to operate in areas prone to tropical storms with **extreme wind speeds**
- Accommodating **local legislation and design standards**





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**PRESENTER NAME**
Presenter Title